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Synthesis of maximum water recovery network for batch process systems

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Abstract

Development of maximum water recovery (MWR) networks for continuous processes based on Pinch Analysis has been rather well established. In contrast, less work has been done on the water minimisation problem for batch process systems. This work presents a two-stage procedure for the synthesis of an MWR network for a batch process system, covering both mass transfer-based and non-mass transfer-based water-using processes. The first stage of the synthesis task is to locate the various network targets, which include the overall and interval-based minimum utility targets (fresh water and wastewater flows) as well as storage capacity target using the newly developed time-dependent water cascade analysis (WCA) technique. In the second stage, a new tool called the time-water network is introduced to help in the development of the MWR network to achieve the established utility targets. This new network representation has an advantage of clearly depicting the time-dependent nature of a batch water network.

Keywords: Water minimisation; Pinch analysis; Batch process systems; Utility targeting; Network design

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